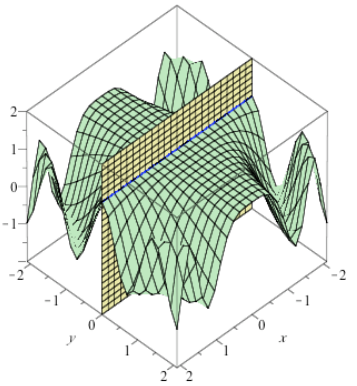
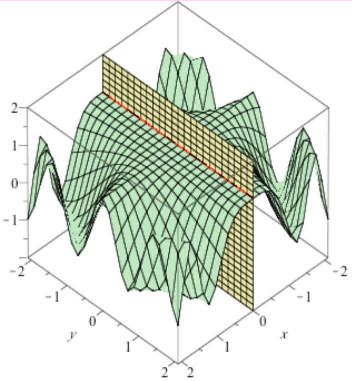


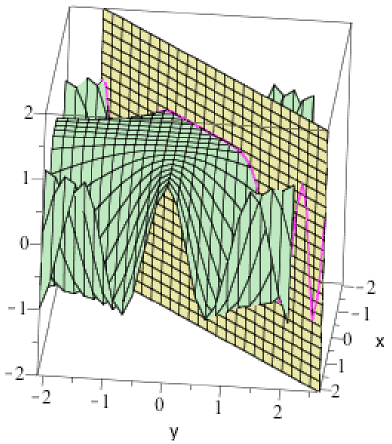
The curve formed by intersecting the plane $y = 0$ with the surface is a horizontal line

$\frac{\partial f}{\partial x}$ will be zero at any point of the form $(x, 0)$.



The curve formed by intersecting the plane $x = 0$ with the surface is also a horizontal line.

$\frac{\partial f}{\partial y}$ will be zero at any point of the form $(0, y)$



The curve formed by intersecting the plane $y = x$ with the surface is a much more interesting curve.

This means that the *directional derivatives* in this direction at points along this line will vary considerably.

To find $\frac{\partial f}{\partial x}(a, b)$, we looked at

$$\frac{\partial f}{\partial x} = \lim_{h \to 0} \frac{f(a+h, b) - f(a, b)}{h}.$$

To find $\frac{\partial f}{\partial y}(a, b)$, we looked at

$$\frac{\partial f}{\partial y} = \lim_{h \to 0} \frac{f(a, b+h) - f(a, b)}{h}.$$

Find the following directional derivatives:

1. $f(x,y) = 2e^{4x/y} - 2x$, $(a,b) = (2,-1)$, in the direction of $< 1, 3 >$

2. $f(x,y,z) = x^3yz^2 - 4xy$, $(a,b,c) = (1,-1,2)$, in the direction of $< 2, 0, -1 >$.